Smithsonian Center
for Materials Research and Education

Wood Analysis Report

DATE:	**9/17/02**
SCMRE#:	**5779**
OBJECT:	**Charcoal from Biggs' Ford**
ACCESSION #:	**18FR14, Lot 59**
RESPONSIBLE PERSON, DIV, DEPT:	**Howard Wellman, JPPM, MAC Lab**
SUSPECTED PROVENANCE:	**Maryland**
OWNER:	**State of Maryland (Maryland Historical Trust)**
EXAMINED BY:	**Harry A. Alden**

Several charcoal fragments were removed from a soil block at the Maryland Archaeology Conservation (MAC) Laboratory. The surrounding soil matrix was removed manually with a dental pick or was softened by application of ethanol with a small artists brush. Most of the fragments were mounted on stubs and carbon coated for Scanning Electron Microscopy. The fragments were too small and fragile to be examined with standard optical microscopy.

The charcoal samples were extremely deteriorated, with minimal cellular detail and numerous fungal hyphae (Fig. 1). This deterioration made a positive identification impossible. However, assuming that the features seen in the following figures are not artifacts of sample deterioration or of preparation of the sample for SEM, It is most likely that the charcoal sample is a species in the Yellow Pine Group.

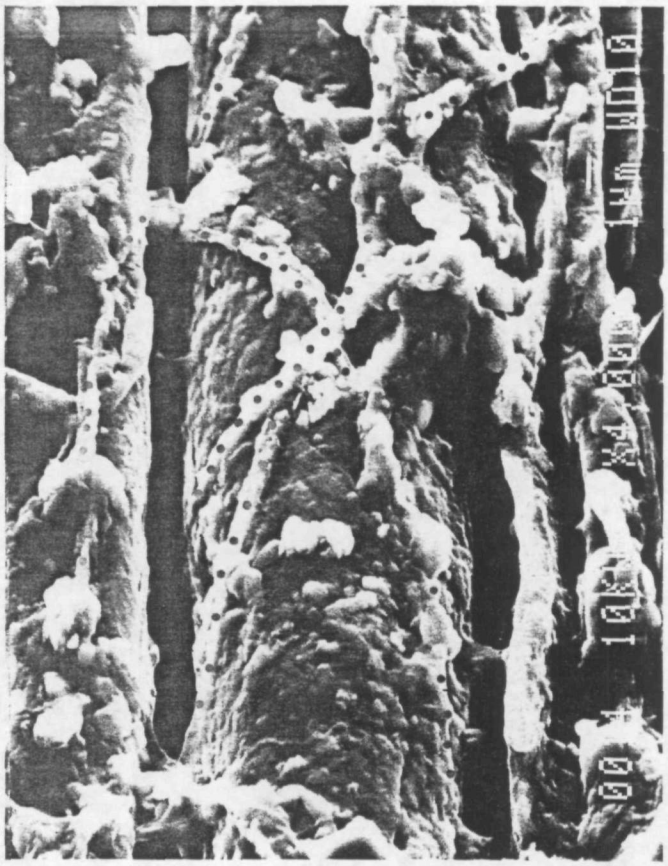


Fig. 1. SEM of a charcoal fragment, showing numerous fungal hyphae (red dots).

The charcoal sample contained a three-dimensional framework of axially and radially aligned cells (Figs. 2 & 3) that are produced from a vascular cambium, which identifies it as a piece of wood charcoal.

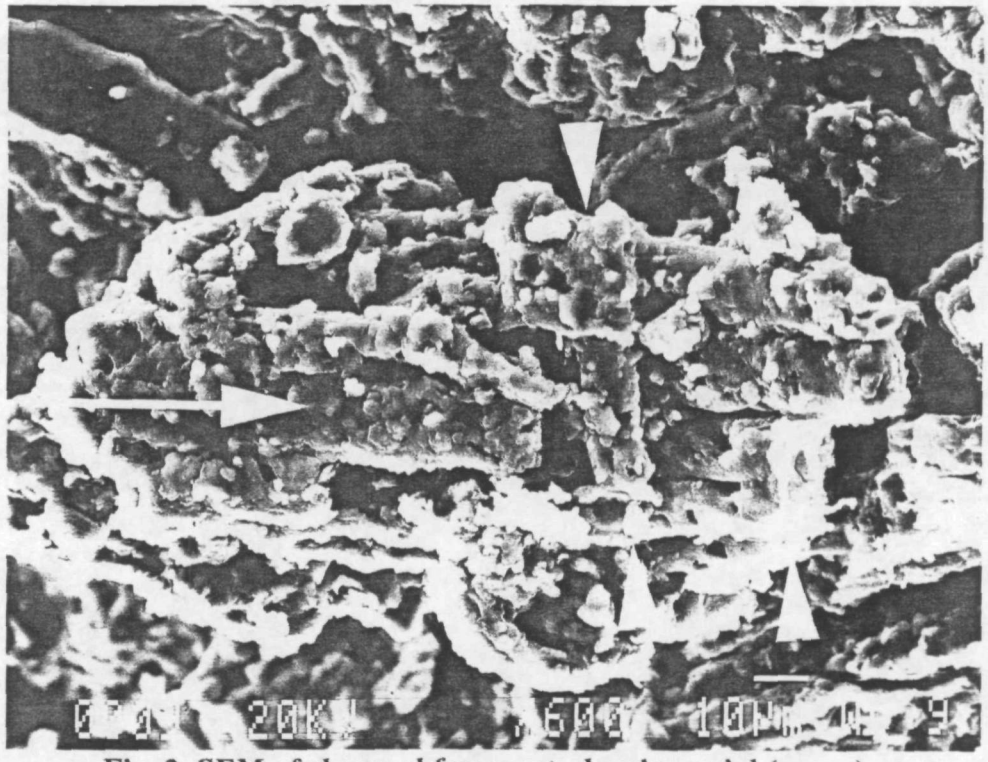


Fig. 2. SEM of charcoal fragment, showing axial (arrow) and radial (arrowheads) orientation of cells.

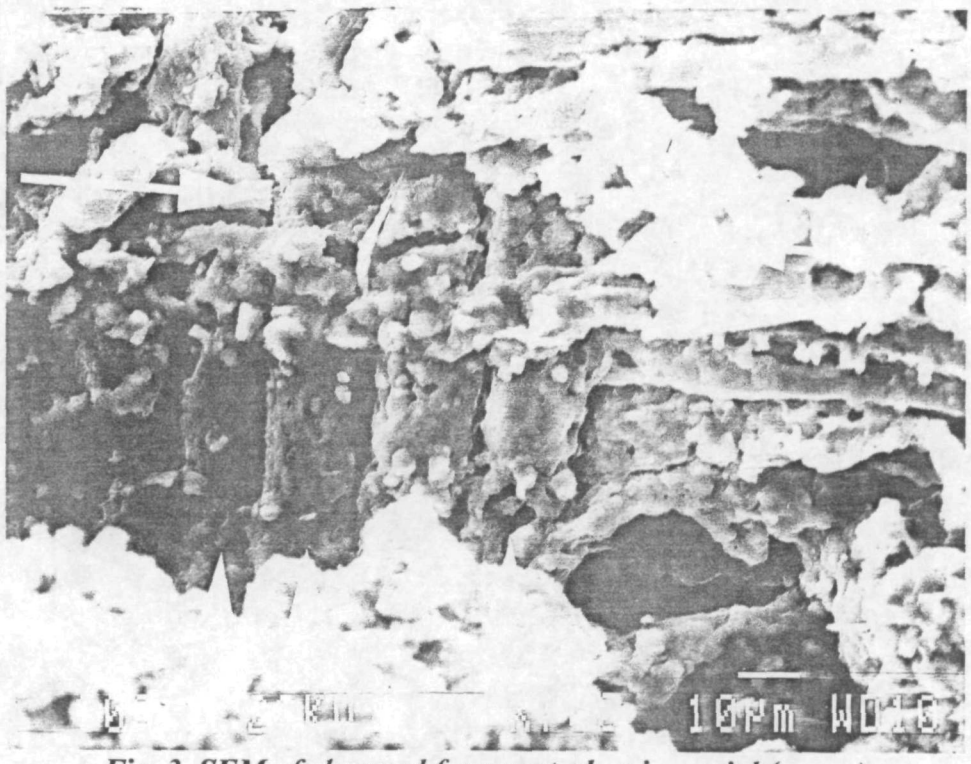
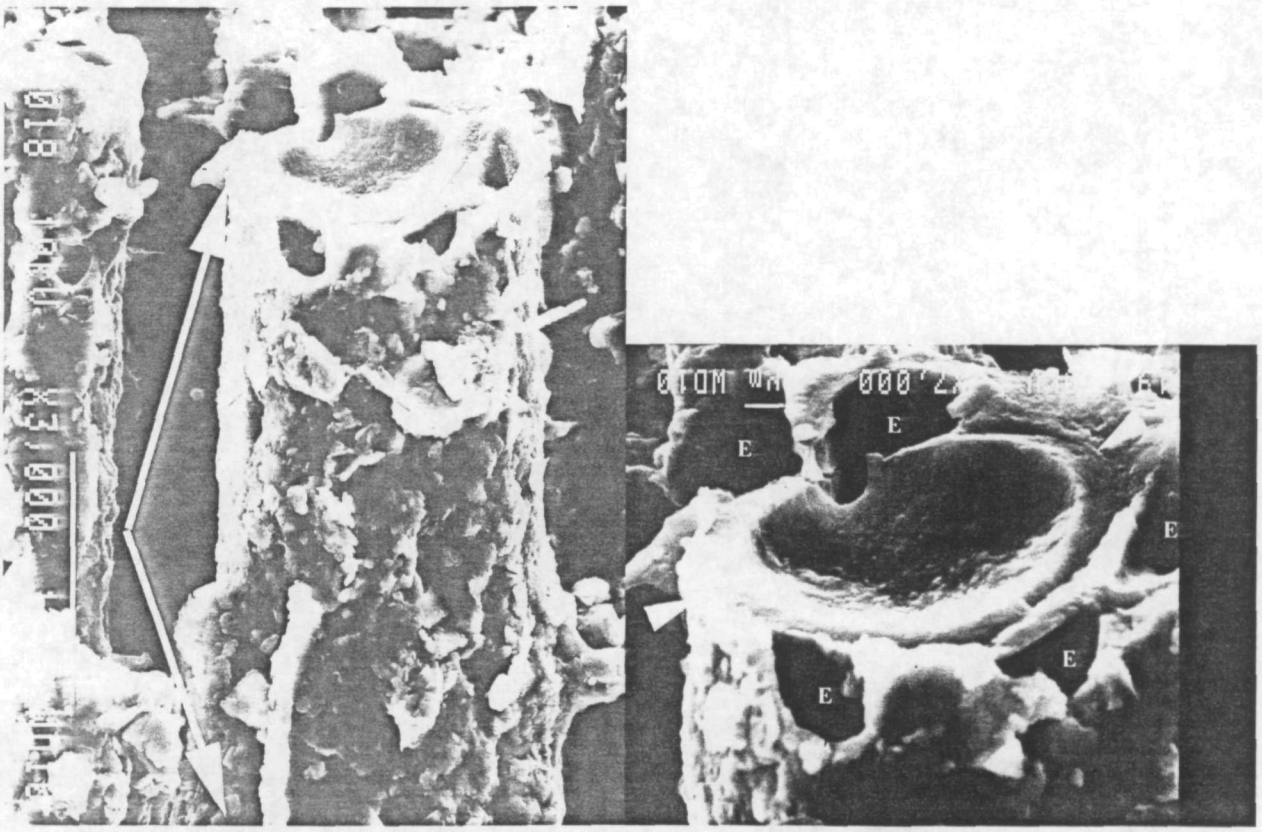


Fig. 3. SEM of charcoal fragment, showing axial (arrow) and radial (arrowheads) orientation of cells.

The sample lacked vessels and fibers and was composed of tracheids, resin canals (Figs. 4 – 6) and parenchyma cells, indicating a softwood (such as pine, fir or spruce).



Figs. 4 & 5. SEM of charcoal fragment, showing a resin canal (arrows & arrowheads) surrounded by epithelial cells (E).

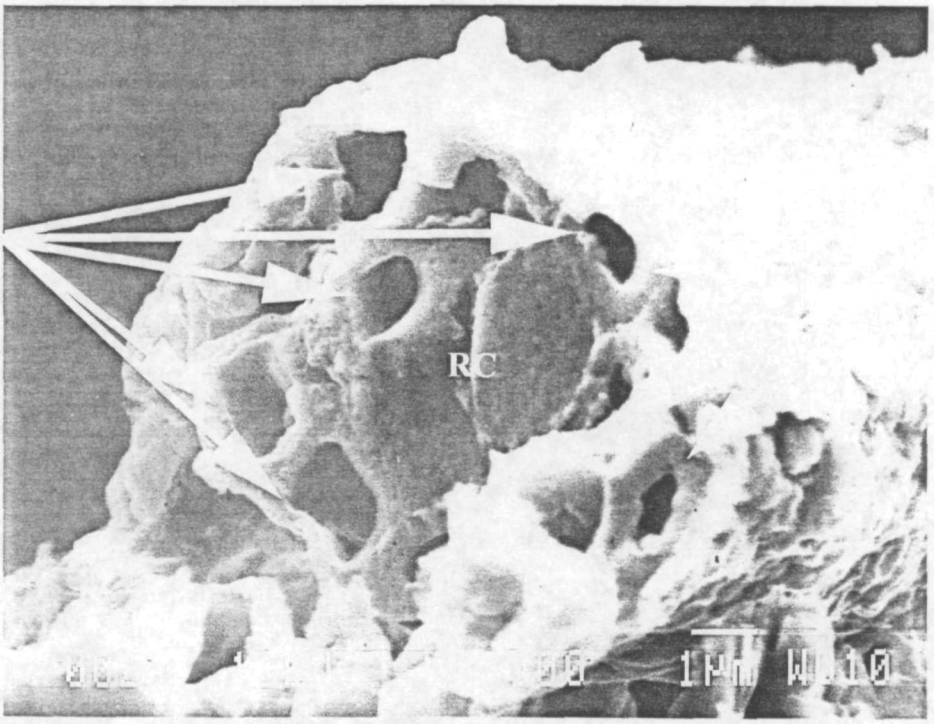


Fig. 6. SEM of charcoal fragment, showing a resin canal (RC) surrounded by epithelial cells (arrows).

The sample appears to have dentate ray tracheids (Fig. 7), which narrows the possibilities to a species of pine in the Yellow Pine Group (*Pinus* sp.).

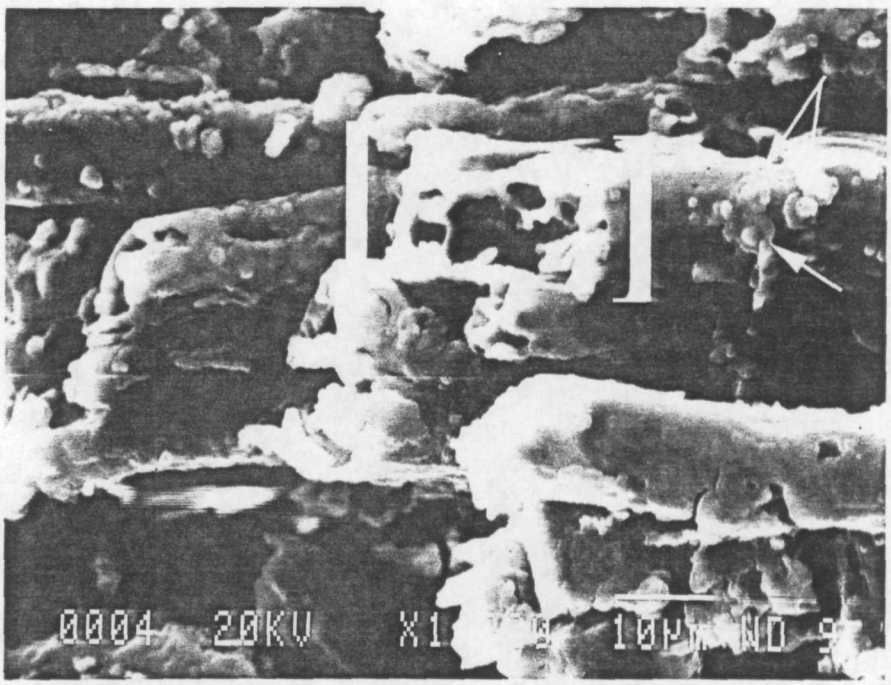


Fig. 7. SEM of a charcoal fragment, showing the interior of a dentate ray tracheid (brackets) with diagnostic circular bordered pits (arrows).

Assuming that the distribution of pines along the mid-Atlantic coast has not changed from the time of the charcoal samples to that of the construction of the range maps (1960's), there are 6 potential candidates from the Yellow Pine Group. These are listed in Appendix A, along with a range map for each in Appendix B.

Appendix A: Excerpt from SCMRE Technical Fact Sheet

Yellow Pine Group *Pinus* spp. L. Pinaceae

Pine (*Pinus* spp./Pinaceae) is composed of at least 93 species world-wide and can be separated into four groups based on their micro-anatomy; the Red Pine Group, the White Pine Group, the Yellow or Hard Pine Group and the Foxtail/Pinyon Group.

The Yellow or Hard Pine Group contains about 48 species that grow in Africa (1), Asia(4), Europe(1), Central America(7) and North America(35). **All species in this group look alike microscopically.**

Distribution of Eastern North American Species and their Common Names:

General Area	Species	Common Name	Location
North America	echinata	Shortleaf Pine	North America (southeast US)
North America	elliotii	Slash Pine	North America (southeast US)
North America	glabra	Spruce Pine	North America (southeast US)
North America	palustris	Longleaf Pine	North America (southeast US)
North America	rigida	Pitch Pine	North America (New England to southern Appalachians)
North America	serotina	Pond Pine	North America (southeast US)
North America	taeda	Loblolly Pine	North America (southeast US)
North America	virginiana	Virginia Pine	North America (eastern US)

Additional Reading:

Anon. *Pinus palustris*: pitch pine. Wood. 1937; 2(1):17-18.

Berni, C. A; Bolza, E., and Christensen, F. J. South American Timbers - The Characteristics, Properties and Uses of 190 Species. *Pinus elliottii.* Australia: Division of Building Research, Commonwealth Scientific and Industrial Research Organization; 1979.

Boyer, W. D. *Pinus palustris* Mill. Longleaf Pine. in: Burns, R. M. and Honkala, B. H., tech. coords. Silvics of North America. Volume 1, Conifers. Washington, DC: USDA Forest Service; 1990; pp. 405-412.

Critchfield, W. B. and Little, JR. E. L. Geographic distribution of the pines of the world. Washington, D.C.: USDA Forest Service, Misc. Pub. 991; 1971.

Coulter, J. M. and Rose, J. N. Synopsis of North American pines, based upon leaf-anatomy. Botanical Gazette. 1886; 11:256-262.

Gaby, L. I. The southern pines, an American wood. Washington, DC, USA: USDA Forest Service, FS-256; 1985.

Lohrey, R. E. and Kossuth, S. V. *Pinus elliottii* Engelm. Slash Pine. in: Burns, R. M. and Honkala, B. H., tech. coords. Silvics of North America. Volume 1, Conifers. Washington, DC: USDA Forest Service; 1990; pp. 338-347.

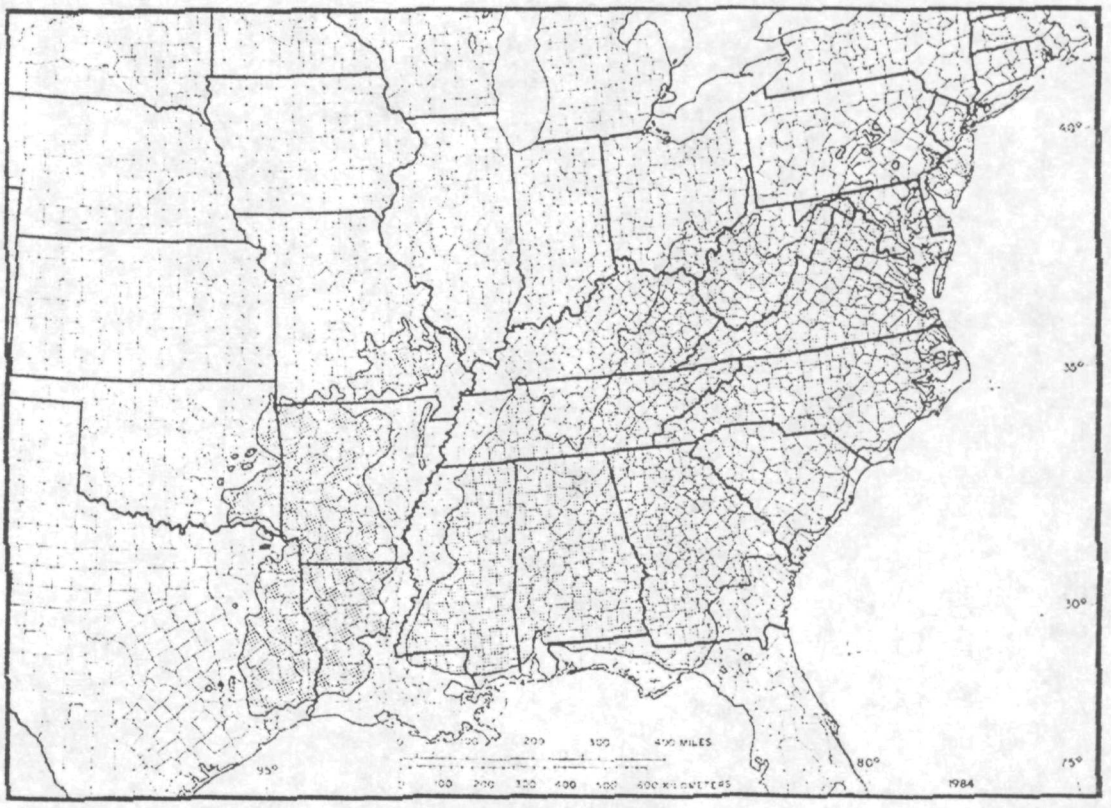
Mirov, N. I. The genus *Pinus*. New York: Ronald Press; 1967.

Rendle, B. J., compiler//editor. World Timbers. Vol. 1 – III. London, England: Ernest Benn Limited; 3 p. 164. 1969-70.

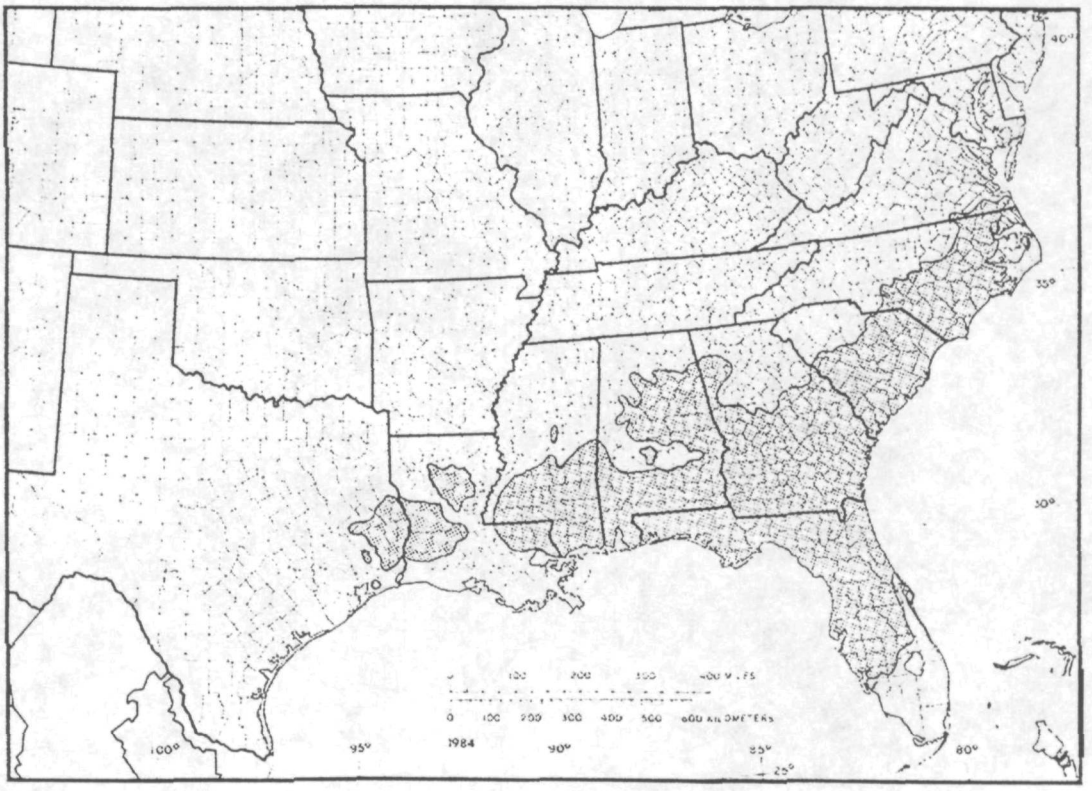
Sternitzke, H. S. and Nelson, T. C. The southern pines of the United States. Economic Botany. 1970; 24(2):142-150.

van Ravenswaay, C. Winterthur Portfolio 7. 1972. A historical checklist of the pines of eastern North America. Charlottesville, VA, USA: University Press of Virginia.

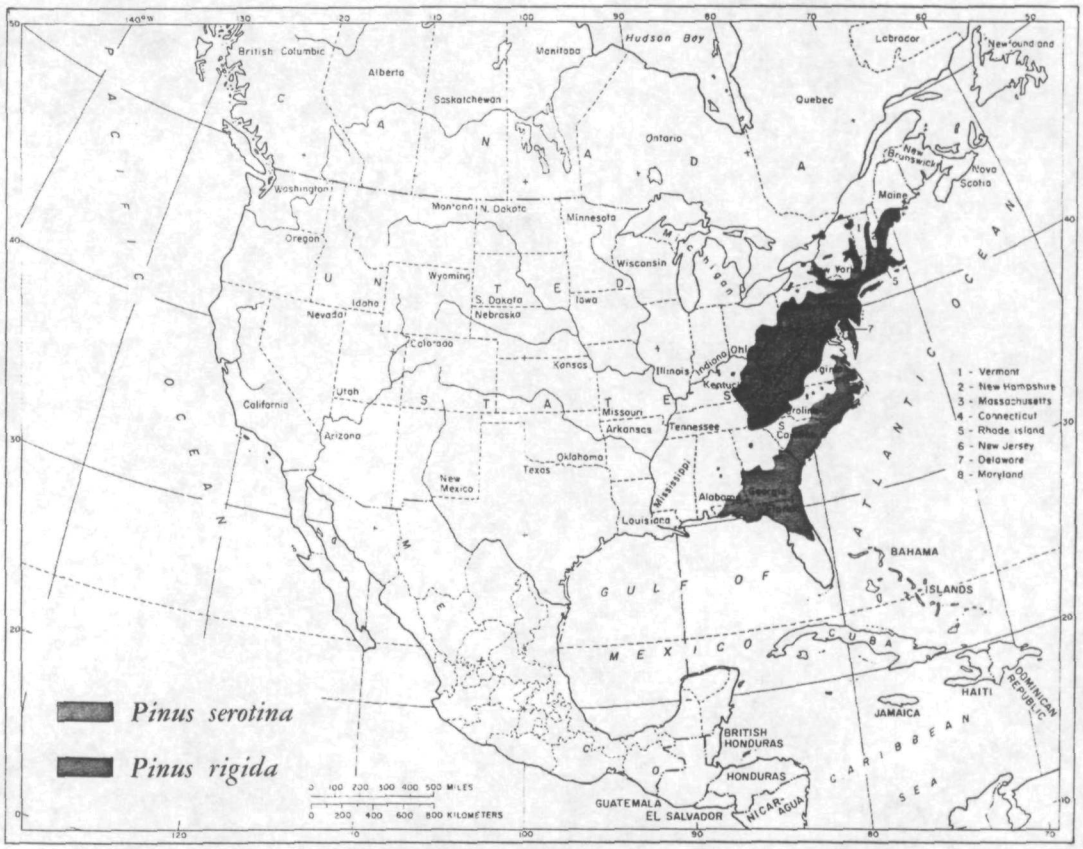
Appendix B: Maps from
Non-Technical Information of North American Softwoods by Harry Alden



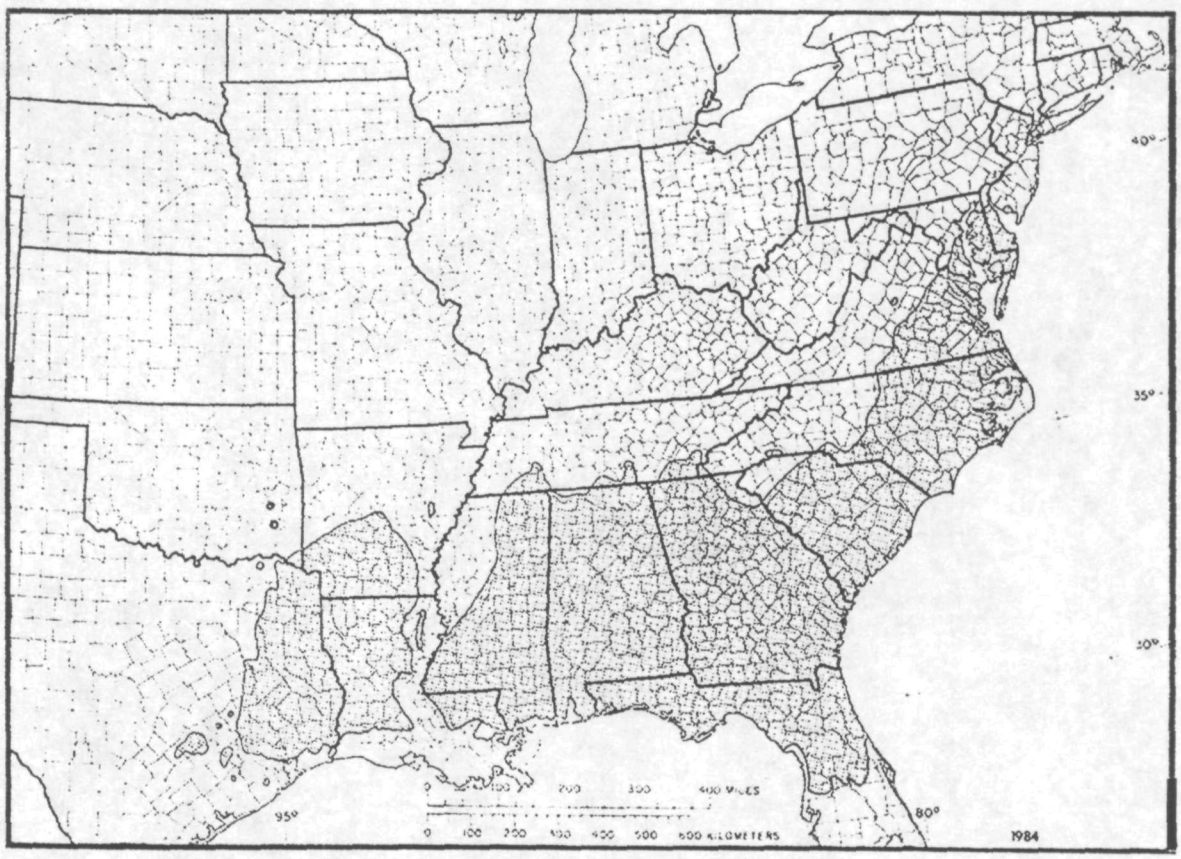
Shortleaf Pine (*Pinus echinata*)



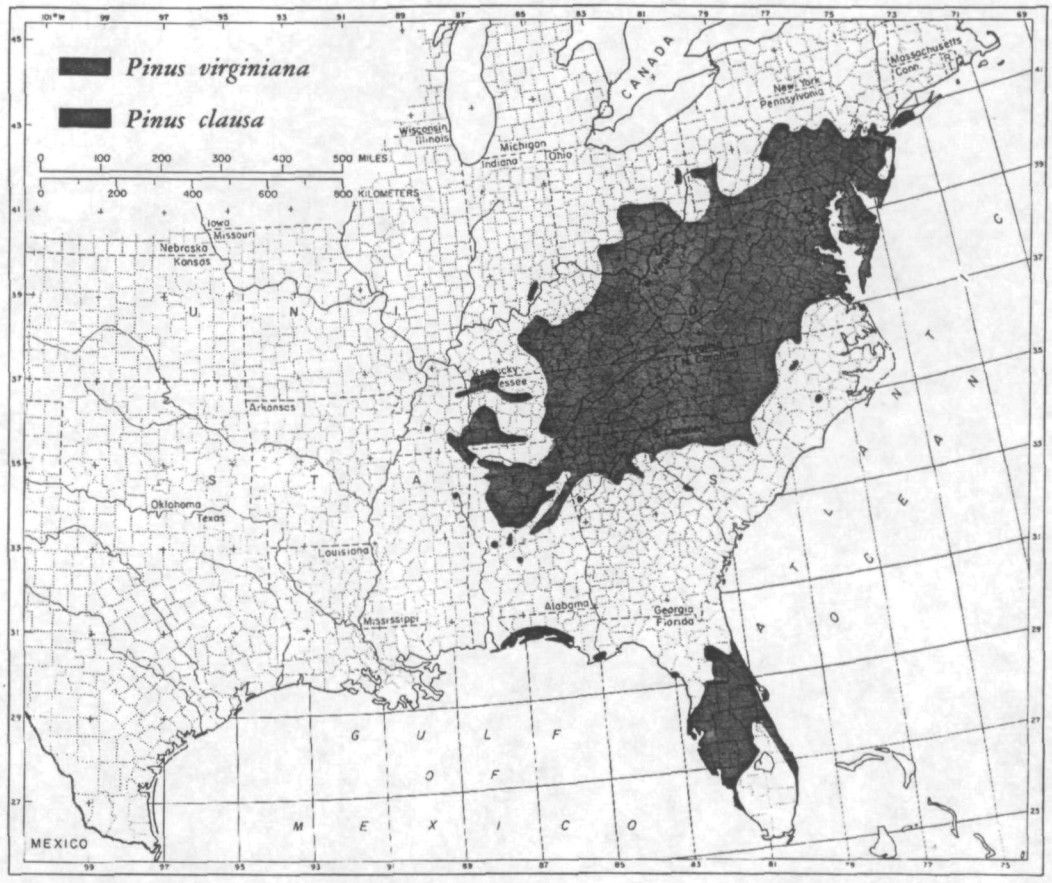
Longleaf Pine (*Pinus palustris*)



Pitch Pine (*Pinus rigida*) & Pond Pine (*Pinus serotina*)



Loblolly Pine (*Pinus taeda*)



Virginia Pine (*Pinus virginiana*)